UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/551,740	09/30/2005	Alexander Ralph Beeck	2002P19478WOUS	4282

28524 7590 08/02/2010

SIEMENS CORPORATION
INTELLECTUAL PROPERTY DEPARTMENT
170 WOOD AVENUE SOUTH
ISELIN, NJ 08830

EXAMINER	
SANDERS, JAMES M	

ART UNIT	PAPER NUMBER
1791	

MAIL DATE	DELIVERY MODE
08/02/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/551,740
Filing Date: September 30, 2005
Appellant(s): BEECK ET AL.

Janet D. Hood
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 5/19/10 appealing from the Office action mailed 1/21/10.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

This appeal involves claims 17-18 and 21-28.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct. No amendments have been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the appellant's brief is correct.

(8) Evidence Relied Upon

Deckard (US 4863538)

Sachs et al (US 5340656)

Lewis et al (US 5837960)

Loschau (Ceramics: Getting into the 2000's)

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

1. Claims 17-18, 21-26 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Deckard (US 4863538, already of record), further in view of Sachs et al (US 5340656), and further in view of Lewis et al (US 5837960, already of record).

For claim 17, Deckard teaches a process for producing a shaped object from a powder bed, comprising: preparing a powder bed having a first powder mix in a first region and forming a first region of the shaped object by a first laser sintering of the first powder mix (Figs. 1 & 2, cl 5 ln 64 to cl 6, ln 2).

Deckard does not teach a second powder mix in a second region, the first and second powder mixes differing from each other in at least one of chemical composition and powder particle size distribution, and forming a second region of the shaped object integral with the first region by a second laser sintering of the second powder mix.

However, in the same field of endeavor pertaining to producing a shaped object from a powder bed, Sachs et al teach a second powder mix in a second region, the first and second powder mixes differing from each other in at least one of chemical composition and powder particle size distribution (cl 11 lns 15-20).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Sachs et al with those of Deckard for benefit of producing shaped objects with regions of different materials.

Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form a second region of the shaped object integral with the first region by a second laser sintering of the second powder mix, since one having ordinary skill in the art at the time the invention was made would recognize this limitation as nothing more than the duplication of parts for a multiple effect and could seek the benefit of producing shaped objects with regions formed of different materials. Please see MPEP 2144.04 (VI) and In re Harza, 274 F.2d 669, 671, 124 USPQ 378, 380 (CCPA 1960) for further details.

The previous combination does not teach the forming of at least one of the first and second regions comprises controlling the respective laser sintering step to provide different material properties in the first and second regions of the shaped object, and controlling a laser beam generated during the first and second laser sintering processes to produce a different sintering temperature over the first and second regions of the object creating a different degree of densification in the first and second regions of the shaped object.

However, in a related field of endeavor pertaining to producing a shaped object from a powder with directed light, Lewis et al teach the forming of at least one of the first and second regions comprises controlling the respective laser sintering step to provide different material properties in the first and second regions of the shaped object (cl 4 lns

20-21 i.e. Another object is to produce articles having variable density, and cl 22 lns 1-8 i.e. Decreasing laser power results in less melting of the powder, thus reducing density, and cl 21 lns 14-22 i.e. It is expected that smoother surfaces will be attained by use of powder of smaller size and by reducing the size of the powder spot. Rough surfaces might also be smoothed by laser ablation, using the laser in a pulsed mode to remove small amounts of material, or by passing the laser beam over the surface in order to melt a very thin surface layer). Examiner points out that as densification is controlled it is inherent that porosity is also controlled and vice versa. As cited above, Lewis et al teach that the melting is not necessarily complete and Examiner considers that the incomplete melting is equivalent to "sintering." Lewis et al further teach controlling a laser beam generated during the first and second laser sintering processes to produce a different sintering temperature over the first and second regions of the object creating a different degree of densification in the first and second regions of the shaped object. (cl 22 lns 1-5 i.e. An article whose density varies, that is, has different densities at different locations, may be formed by varying laser power...Decreasing laser power results in less melting of the powder, thus reducing density). It is inherent that areas subjected to different laser powers would have different temperatures. Also, Lewis et al teach different laser power levels for each material based on melting points (cl 17 lns 17-20)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Lewis et al with those of the previous combination for benefit of producing shaped objects with regions of more widely varying different material properties.

For claim 18, the previous combination does not teach a ceramic mold is formed.

However, Lewis et al teach a process for producing a ceramic shaped object from ceramic powder (cl 1 lns 21-22 i.e. The present invention may be used to produce articles of any material which is obtainable in the form of a powder, and cl 21 lns 40-44 i.e. For example, turbine blades...might be fabricated...as the tip portion of the blade is formed, using an abrasion resistant material, such as carbide, boride..., and cl 21 lns 56-57 i.e. a hacksaw blade may be coated with tungsten carbide in the toothed section of the blade). Lewis et al do not explicitly teach a ceramic mold is formed, but they do teach fabrication of dies (cl 4 lns 8-9) and fabrication of fixtures for use in conventional high-volume production of articles (cl 4 lns 9-10) and since a mold is an alternative for a die and because a mold can be used many times, fabrication of a mold having regions with dissimilar properties would have been obvious to one having ordinary skill in the art at the time the invention was made.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Lewis et al with those of the previous combination for benefit of producing a particular kind of shaped object with recognized utility for repeated production of articles.

For claim 21, Deckard teaches post formation treatments including heat treatment for the objects produced (cl 6 ln 55 to cl 7 ln 2 i.e. some type of parts may require certain material properties which can be achieved by heat treating).

Also, Lewis et al teach an operative principle that the amount of heat applied influences density (cl 22 lns 7-8 i.e. The operative principle is that a reduction in heat

input per unit of mass causes a reduction in density) so that an increase in heat input per unit of mass causes an increase in density. Further, Lewis et al teach an increased density of hot-pressed powder compared to cold-pressed powder (cl 13 lns 9-11 i.e. that of cold-pressed powder is usually about 50 to 55% (of theoretical density of the material) and that of hot-pressed powder is usually 80% or more).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Lewis et al with those of the previous combination for benefit of achieving further densification by hot isostatic pressing.

For claim 22, Deckard teaches accessing a computerized representation of the object and using the computerized representation to control the process for producing the shaped object (cl 6 lns 36-49).

For claims 23 and 24, further regarding a ceramic mold is formed taught as obvious by Lewis et al above, Lewis et al do not explicitly teach the first region of the ceramic mold to comprise a shell and the second region of the ceramic mold to comprise a core disposed in a cavity of the shell, or the first region of the ceramic mold comprises an inner region and the second region of the ceramic mold comprises an outer region and the process is controlled so that the inner region is denser than the outer region of the mold. However, they do teach a method of fabrication of dies and fabrication of fixtures for use in conventional high-volume production of articles (see citations for claim 18 above) that is capable of forming a mold having these specific

features and that would have been obvious to one having ordinary skill in the art at the time the invention was made.

For claims 25 and 26, the previous combination does not teach using powder grain sizes of less than 30 micrometers.

However, Lewis et al teach using powder grain sizes of less than 30 micrometers (cl 13 lns 13-15 i.e. Powder sizes used in making articles with the three axis apparatus ranged from about 270 mesh (0.025 mm = 25 micrometers) to about 100 mesh (0.149 mm = 149 micrometers).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Lewis et al with those of the previous combination for benefit of producing shaped objects from established powder grain sizes.

For claim 28, further regarding a ceramic mold is formed taught as obvious by Lewis et al above, Lewis et al do not explicitly teach providing a surface in an inner region of the ceramic mold comprising a surface roughness different from an outer region of the ceramic mold. However, they do teach modifying surface roughness of the formed article (cl 21 lns 18-21 i.e. Rough surfaces might also be smoothed by laser ablation, using the laser in a pulsed mode to remove small amounts of material, or by passing the laser beam over the surface in order to melt a very thin surface layer) and it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a surface in an inner region of the ceramic mold comprising a surface roughness different from an outer region of the ceramic mold.

2. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Deckard, further in view of Sachs et al, further in view of Lewis et al, and further in view of Loschau (Ceramics: Getting into the 2000's, already of record).

The previous combination does not teach at least one of the powder mixes comprises at least one ingredient that affects densification and/or sintering of the powder by producing a liquid phase for at least one of the regions of the object.

However, in the same field of endeavor pertaining to producing ceramic objects by laser sintering, Loschau teaches the ceramic powder comprises at least one ingredient that affects densification and/or sintering of the ceramic powder by producing a liquid phase for at least one of the regions of the object (pg 568 paragraph 1 i.e. Experiments are known on indirect laser sintering of Al2O3 and SiC with low-melting binder…).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Loschau with those of the previous combination for benefit of using more complex mixtures that would impart certain targeted properties to the produced ceramic object.

(10) Response to Argument

Applicant's arguments filed 5/19/10 were fully considered and are not persuasive.

First, Applicant asserts that if Deckard was modified based on the teachings of Sachs et al., "for benefit of producing shaped objects with regions of different materials," as suggested by the Appellee, this would necessarily involve moving the powder 22 from the structure 28 of Deckard into a dispersion head, where it would be successively

applied to form layers, in between which a binder material would be applied, as taught in Sachs et al., and thus the laser 12 and optics disclosed in Deckard would be discarded and unneeded, and this arrangement would render Deckard unsatisfactory for its intended purpose. Examiner, however, maintains, as cited in the rejection of claim 17, that Sachs et al. teach a second powder mix in a second region, the first and second powder mixes differing from each other in at least one of chemical composition and powder particle size distribution and the combination of the Deckard reference is with only this element of and not the whole of the Sachs et al. reference and thus would not render the elimination of the laser 12 in Deckard, since successive layers would not be bonded using the binder material of Sachs et al.

Second, Applicant asserts that the recited step of forming a second region of the shaped object integral with the first region by a second laser sintering of the second powder mix does produce a new and unexpected result. Examiner, however, points out that such result is predictable and one of ordinary skill would expect it.

Third, Applicant asserts that Appellee engaged in improper hindsight by using the Appellant's specification, rather than any prior art reference, to combine the references, since the contention that the dispersion heads would be moved "in such a way" as to not interfere with the performance of the laser is wholly unsupported by any teaching of the prior art. Examiner, however, maintains that it is well within the grasp of one of ordinary skill to move the dispersion heads in such a way so as not to interfere with the performance of the laser, optics, and thus the sintering process.

Finally, Applicant asserts that Lewis et al. merely discloses a melting process, and thus teaches away from a sintering process, which is a method for making objects from powder by heating the powder to below its melting point until the particles adhere to each other and Examiner merely pointed to a teaching of Lewis et al., which discloses that varying laser power causes less melting, which in-turn reduces density and stated that it is inherent that powder particles not melted adhere to each other. This teaching provides no basis in fact or reasonable support for the Examiner's inherency claim and neither Lewis et al., nor any cited prior art reference, alone or in combination, discloses that the respective first/second laser sintering is controlled to provide different material properties in the first and second regions of the shaped object, as recited in independent claim 17. Examiner, however, maintains that incomplete melting is equivalent to sintering and points out that there at least two types of sintering: solid state sintering is a method for making objects from powder by heating the material below its melting point and liquid state sintering is a method in which at least one but not all of the elements exist in a liquid state. Examiner finds no where in claim 17 that it is limited to only solid state sintering. Further, Lewis et al. teach controlling a laser beam generated during the first and second laser sintering processes to produce a different sintering temperature over the first and second regions of the object creating a different degree of densification in the first and second regions of the shaped object. (cl 22 lns 1-5 i.e. An article whose density varies, that is, has different densities at different locations, may be formed by varying laser power...Decreasing laser power results in less melting of the powder, thus reducing density).

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/James Sanders/

/Joseph S. Del Sole/
Supervisory Patent Examiner, Art Unit 1791

Conferees:

/Joseph S. Del Sole/
Supervisory Patent Examiner, Art Unit 1791

/Christine Tierney/
Supervisory Patent Examiner, Art Unit 1700